

efficient assistance for himself and family. They are, however, like other persons, quite susceptible of steadily practicing habits of industry, when proper incentives and artificial stimulants are powerful enough to call forth their energies. There are within the province several regiments of militia, formed of the lower classes of people and Indians, and there are also excellent workmen in felling timber and clearing ground, and not inapt in acquiring any mechanical trade or art. They are, moreover, exceedingly simple in their habits, and are easily maintained, so that, in the projected work of a communication between the Pacific and Atlantic Oceans, some workmen may be obtained at a tolerably moderate rate of wages—a circumstance of much importance in assisting the success of the undertaking, which we still have every reason to believe will be principally the work of foreign labourers, as we shall explain in its proper place.

"The site of Panama, the capital of the Isthmus, has been once changed. The old city stood about three miles east from the present situation. The name is supposed to be derived from the Indian word *panama*, signifying "much fish," from its great abundance along the coast. The first city was originally a village inhabited by Indians, at the invasion by the Spaniards in 1515. The present city of Panama is situated in latitude 9° 57' north, and longitude 79° 30' west from Greenwich, on a rocky tongue of land, shaped nearly like a spear-head, and extending a considerable way into the sea. Its harbour is protected by a number of islands lying at a distance from the main-land, and some of which are of considerable size, and highly cultivated. Its anchorage is good, and it has a plentiful supply of water and provisions. Its great advantage in regard to situation will, no doubt, be one day turned to great commercial profit. The population amounts, according to some, to not more than 12,000, but others make it to contain nearer 25,000 inhabitants, which seems to be more probable estimate. It is tolerably healthy, notwithstanding its high temperature, off we except during the months of August and September, when its increased warmth engenders frightful epidemics.

"Panama is protected by some fortifications, and is divided into the high and low towns, the first, called *Vieja*, being the most densely peopled. Its streets are narrow, dark, and filthy. The houses, for the most part, are built of mud, and covered with a thatch; they are of three stories high in general, and are much neglected in their interior arrangements. It has a large open square, but, through the inattention of the authorities, this is overgrown with weeds, and encumbered with the fallen ruins of a great many buildings, and particularly of the college of Jesuits. Here is a college, in which are professors for Spanish and Latin grammar, philosophy, theology, and public and canon law. The churches and convents, which are still numerous, are built of stone: the cathedral and the hospital are very fine buildings. The neighbourhood of Panama is extensive, but rendered dangerous by the prevailing north winds, which are violent. There is so little depth of water along the shore, that goods can only be landed at one place, and that by using flat-bottomed boats and pirogues. Hence large vessels are obliged to come to at the islands Perico and Flamenco, two miles west; but nevertheless there is a good deal of traffic carried on, principally with the English, the Jamaica and the United States of America. The annual exportation of pearls alone amounts to £40,000 dollars. A good deal of commercial spirit is manifested in the stores for ship's goods and provisions, and well filled with merchandise. Every year there is a well-frequented fair. English fashions and customs have the ascendancy; and even the cuisine of Old England is allowed supremacy. The women wear no head-covering, and parade stately with their long black tresses flowing down their shoulders. The environs of the city are planted with bananas, oranges, figs, and limes; and the marjoram and cocoa-nut trees are beautifully conspicuous in their majestic height. Our readers will remember that Panama was most disturbing port for the commerce of South America with Spain was carried on by means of the galleons; it was then the entrepôt of the commerce of America, Asia, and Europe. Its importance since then has greatly decreased.

"Porto-Bello is situated in latitude 9° 33' north, and longitude 77° 45' west, close to the sea, at the foot of immense mountains which surround the whole of the port. It is, from its situation, most unhealthy, for the sea is exceedingly oppressive; and the town being encompassed by mountains, the freshness of the sea-breeze cannot gain admittance as a relief; while the country being uncleared of wood, and there being a great deal of, nay, almost constant rain and damp, the uninviting features of the place are rendered most repulsive, although some 2,000 mortals contrive to exist in it. Chagres and Porto-Bello are the only towns or villages on the Atlantic shore of the Isthmus. About nine miles east from Chagres is the Bay of Simon, also called Navy Bay, which is large and spacious, being as much as three miles wide at the entrance. The other towns of Panama are of trifling importance. Gatón is a small hamlet; Orogona is somewhat larger, and is a point at which passengers going to Panama frequently land. Crece, however, is of more consequence—it is the place to which goods are always conveyed. It is agreeably situated on a fine open plain, upon the left or southern bank of the river Chagres, about thirty-four miles from its mouth, and eight hours' journey on mule-back from Panama. The inhabitants of these places are, for the most part, owners of canoes or mules, and are engaged in the trade of carrying goods and merchandise; or, *loggers*, that is, persons employed in working canoes. Cruces and Orogona are also places of resort in the dry season, or summer, as watering-places for the inhabitants of Panama; for they are considered extremely salubrious, a reputation likewise enjoyed by the town of Chorreros, situated upon the river of that name.

The, at present, very limited trade on the Atlantic shore of the Isthmus is maintained by Jamaica by a British man-of-war, which sails monthly for the purpose of conveying letters and specie; with Carthagena, by government vessels, twice a month, and also with the same place and a few other points by private trading-vessels, which bring freight to Chagres, and there exchange or sell it. Its commerce on the Pacific is, however, more extensive, embracing all parts of the coast, both north and south, which find it their interest to communicate with Europe by this way. Specie is conveyed across the Isthmus to be embarked at Chagres at an expense of ten dollars, and there is a transit duty of three per cent. on silver and one per cent. on gold. In return, goods are brought to Panama, where they are lodged in the custom-house immediately on their arrival. When for exportation, they pay a duty of two per cent., but if for home consumption, one is imposed according to the nature of each particular article. Limited as the trade of the Isthmus is, it is yet somewhat improving. The receipts of the treasury of the government of Panama in the year 1827, are assured by good authority, amounted in round numbers to 250,000 dollars, of which was left a balance in the public chest of nearly 3,000 dollars, after providing for all the expences of the state; and there is reason to suppose that since that period the finances of the territory have improved. The receipts are not one-third, it is true, of what they were in the year 1812, when Panama was a colony of Spain; but this we are not surprised at when we consider the grinding, exclusive system of dealing which was universally adopted by that unfortunate government. It is important to mention, that by the best arrangement of the territorial distribution of this country, it became the north-western boundary of New Granada, one of the three republics into which Colombia was divided in the year 1832.

"Now, in considering the merits of the Isthmus of Panama as a point at which to attempt the junction of the two oceans, we must not allow our judgment to be led aside by a circumstance which is no doubt calculated to render us liable to be warped from an impartial view of the matter; we mean this: the Isthmus presents the narrowest barrier to the meeting of the two mighty waters, and, in consequence, commercial assistance we are so anxious for. That is not all, not only its form, but its peculiarly convenient position with respect to the civilised world, seems to draw us, as it were, instinctively towards it, as to a place which nature

has formed and destined expressly for the great purpose of aiding man in beneficial intercourse with his fellow-men, and has therefore, it would appear, loudly written in its lineaments a powerful appeal to him to model it to his necessities. The land retiring on either side seems only the more to woo on the embraces, while even its stern hills stoop in encouraging aid of the longed-for union. Nature, however, does not send things out of her laboratory so nicely adjusted to our hand, but has wisely left much to give play to our mental exercise and industrial perseverance; and has taught us, and that too frequently by dear-bought experience, that the most encouraging appearances are but the meretricious lures of empty illusion. But, reader, consider a canal across the Isthmus of Panama could be effected—we mean a ship canal—yet in the present social condition of that country such an undertaking is altogether impracticable, as we shall endeavour to explain in a future number of this magazine."

The above extracts, upon so important a subject, are of the more interest from the proposed Central American communication, bringing only part of a general system of continental isolation which is proposed to take place simultaneously by separating the Americas, uniting the Mediterranean with the great Indian Ocean, and the dismemberment of Spain from the rest of Europe; to the end that as an indissoluble union has been out of the Atlantic the greater part of the world, in order that one religion, one tongue, one body of literature, one civilization may pervade the whole, no one bond of union may girdle the entire body and all its members, by means of easy and rapid communications, where formerly months, and at one time even years, were expended in once effecting intercourse.

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INSTITUTION OF CIVIL ENGINEERS.

Figs. 6. — The President in the Chair. —The first paper read was by Mr. S. B. Moody. It described a water-wheel, constructed by Mr. W. Fairbairn, from the designs of Mr. B. Albano, and erected at the Flax-mills in Lombardy. The chief peculiarities of this wheel consisted in the introduction of the tension principle for the arms, and the ventilation principle for the buckets.

The use of wrought-iron bars as arms and braces on the tension principle diminished the weight, as fewer centres and arms were required, and consequently a lighter shaft could also be employed; repairs were less frequent, and also were not so expensive as with cast-iron arms.

In the old form of the buckets, the air entering with the water, prevented them from filling; but by this introduction of an inner shafting, forming a space between it and the sole plate, the air was permitted to pass off freely, and the buckets, being thus ventilated, were enabled to be more completely filled, and the effective power of the wheel was increased. Mr. Albano explained its construction, and stated that its speed was about six feet per second, and that the useful effect obtained was equal to 6-10ths of the power expended, which was higher than many of the best wheels had attained. He then described a very ingenious adaptation of the balance weight governor for the penstock, for regulating the flow of the water to the wheel.

A description of a water meter, by Mr. P. Carmichael, was then read. The mode of operation of this meter, which was attached to the feed pumps of three steam boilers supplying an eighty-horse engine, was thus described: As the water proceeds through the discharge valve the float rises until it comes in contact with a detent, or catch, attached to a rod which is suspended from a lever. This moves round a spanner and pendulum until it passes the centre of gravity, when the pendulum falls and strikes a spanner, which shuts the discharge valve and opens the inlet valve from the reservoir to the closed box which supplies the boiler. A dial, the hand of which was acted upon by the spanner, indicates the number of times of the emptying of the reservoir, and it was stated that the action of the machine was very correct.

Dr. Roth's automatic calculator was exhibited, and its action explained by Mr.